

WHAT IS CLAIMED IS:

1. A telescopic shaft for a vehicle steering,
assembled in a steering shaft of a vehicle and
constructed by fitting a male shaft and a female
5 shaft to each other so as to be unable to rotate but
to be slidable, said telescopic shaft comprising:

a first torque transferring member interposed
via an elastic member between one line of axis-
directional groove and one line of axis-directional
10 groove formed respectively on an outer peripheral
surface of said male shaft and on an inner peripheral
surface of said female shaft; and

a second torque transferring member interposed
between another line of axis-directional groove and
15 another line of axis-directional groove formed
respectively on the outer peripheral surface of said
male shaft and on the inner peripheral surface of
said female shaft,

said elastic member including:

20 a transferring member sided contact portion
abutting on said first torque transferring member;

a groove sided contact portion spaced away at an
predetermined interval substantially in a peripheral
direction from said transferring member sided contact
25 portion and abutting on a groove surface of the axis-
directional groove of said male shaft or said female
shaft; and

a biasing portion elastically biasing said transferring member sided contact portion and said groove sided contact portion in such a direction as to separate from each other,

5 wherein a rigidity of said transferring member sided contact portion is differentiated from a rigidity of said groove sided contact portion.

2. A telescopic shaft for a vehicle steering
10 according to claim 1, wherein said first torque transferring member is a rolling member rolling when both of said male shaft and said female shaft make relative movements in the axis-direction, and

 said second torque transferring member is a
15 slide member sliding when both of said male shaft and said female shaft make the relative movements in the axis-direction.

3. A telescopic shaft for a vehicle steering
20 according to claim 1 or 2, wherein said biasing portion of said elastic member takes a bent shape bent between said transferring member sided contact portion and said groove surface sided contact portion.

25 4. A telescopic shaft for a vehicle steering according to claim 1 or 2, wherein said elastic member is constructed of an integral molding product

made from thin plate spring steel.

5 5. A telescopic shaft for a vehicle steering according to claim 1 or 2, wherein surface hardness of said transferring member sided contact portion is set higher than surface hardness of a portion extending from said groove surface sided contact portion to said biasing portion.

10 6. A telescopic shaft for a vehicle steering according to claim 1 or 2, wherein said biasing portion is formed with holes for reducing a biasing force.

15 7. A telescopic shaft for a vehicle steering according to claim 1 or 2, wherein a plate thickness of said transferring member sided contact portion is set thicker than a plate thickness of a portion extending from said groove surface sided contact
20 portion to said biasing portion.

 8. A telescopic shaft for a vehicle steering according to claim 1 or 2, wherein said transferring member sided contact portion is formed substantially
25 in a circular arch shape.

 9. A telescopic shaft for a vehicle steering,

comprising:

5 a male shaft formed with first and second axis-directional grooves extending in an axis-direction on an outer peripheral surface at an interval of a predetermined angle;

10 a female shaft disposed coaxially with said male shaft, formed with third and fourth axis-directional grooves extending in the axis-direction on an inner peripheral surface in a way that corresponds to said first and second axis-direction grooves, and fitted onto said male shaft;

15 a first torque transferring member interposed between said first axis-directional groove of said male shaft and said third axis-directional groove of said female shaft;

an elastic member interposed between said first torque transferring member and said first axis-directional groove of said male shaft, and extending in the axis-direction;

20 a second torque transferring member interposed between said second axis-directional groove of said male shaft and said fourth axis-directional groove of said female shaft; and

25 said telescopic shaft being assembled in a steering shaft of a vehicle and constructed by fitting said male shaft and said female shaft to each other so as to be unable to relatively rotate but to

be slidable,

wherein said elastic member is integrally formed with a first contact portion at which the elastic member is in contact with said first torque
5 transferring member, a second contact portion at which said elastic member is in contact with said groove surface of the male shaft, and a biasing portion holding elastically said members in the preloaded and contacted state with the first and the
10 second contacting portions being spaced away from each other; and

the preload caused by said biasing member is so set not to exceed a tolerance value of a surface pressure at said second contact portion against said
15 first torque transferring member.

10. A telescopic shaft for a vehicle steering according to claim 10, wherein said first axis-directional groove of said male shaft has groove
20 sided surfaces exhibiting a line symmetry with respect to a diametrical direction and a groove bottom surface connecting said groove sided surfaces,

said first contact portion of said elastic member is constructed of transferring member sided
25 contact portions each abutting on said first transferring member,

said second contact portion of said elastic

member is constructed of groove surface sided contact portions each abutting on said groove sided surface,

5 said biasing portion connecting said transferring member sided contact portion to said groove surface sided contact portion on the side of an outer diameter and biasing said two contact portions in such a direction as to separate from each other, and

10 said elastic member further integrally has a connecting portion connecting said transferring member sided contact portion to said groove surface sided contact portion on the side of an inner diameter.

15 11. A telescopic shaft for a vehicle steering according to claim 10 or 11, wherein said first torque transferring member is constructed of a plurality of spherical rolling members, and

20 said second torque transferring member is constructed of a needle roller.

ABSTRACT

A telescopic shaft for a vehicle steering, assembled in a steering shaft of a vehicle and constructed by fitting a male shaft and a female shaft to each other so as to be unable to rotate but to be slidable, the telescopic shaft, has a first torque transferring member interposed via an elastic member between one line of axis-directional groove and one line of axis-directional groove formed respectively on an outer peripheral surface of the male shaft and on an inner peripheral surface of the female shaft; and a second torque transferring member interposed between another line of axis-directional groove and another line of axis-directional groove formed respectively along the outer peripheral surface of the male shaft and along the inner peripheral surface of the female shaft. The elastic member includes a transferring member sided contact portion abutting on the first torque transferring member, a groove sided contact portion spaced away at an predetermined interval substantially in a peripheral direction from the transferring member sided contact portion and abutting on a groove surface of the axis-directional groove of the male shaft or the female shaft; and a biasing portion elastically biasing the transferring member sided contact portion and the groove sided contact portion

in such a direction as to separate from each other,
wherein a rigidity of the transferring member sided
contact portion is differentiated from a rigidity of
the groove sided contact portion.